

AN AMBICOLORATE FLOUNDER, *PARALICHTHYS ISOSCELES* (PLEURONECTIFORMES: PARALICHTHYIDAE), COLLECTED OFF PENINSULA VALDES (ARGENTINA). Juan M. DIAZ DE ASTARLOA, Departamento de Ciencias Marinas, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Mar del Plata, Funes 3350 (7600), Mar del Plata, ARGENTINA.

ABSTRACT. - An almost wholly ambicolorate specimen of *Paralichthys isosceles* Jordan, 1891 was captured off the coast of Península Valdés, Argentina (42°48'S). The specimen showed some morphological peculiarities compared with the normal flatfish of the same species. The upper eye is situated slightly behind the lower eye, and close to the dorsal margin of the head. The interorbital space is more than twice wider than that of a typical *P. isosceles*. There is a shallow depression in the frontal region, anterior to the upper eye. The pelvic fin of the blind side is 27.8% longer than that of the ocular side. In normal specimens, the pelvic fin of the blind side is shorter than that of ocular side. This is the first recorded occurrence of ambicoloration in this species.

RÉSUMÉ. - Un spécimen ambicoloré de *Paralichthys isosceles* (Pleuronectiformes: Paralichthyidae) capturé au large de la Péninsule Valdés, (Argentine).

Un exemplaire presque entièrement ambicoloré de *Paralichthys isosceles* Jordan, 1891 a été capturé sur le plateau continental argentin, à la latitude de la Péninsule Valdés (42°48'S). Les particularités suivantes le distinguent des spécimens normaux de la même espèce: l'oeil supérieur est placé légèrement en arrière de l'oeil inférieur, près du bord dorsal de la tête. L'espace interorbital est compris presque deux fois dans celui d'un *P. isosceles* normal. Une dépression peu prononcée déforme la région frontale, en avant de l'oeil supérieur. La nageoire pelvienne du côté avengle est plus courte que celle du côté oculé. Ce spécimen constitue le premier cas enregistré d'ambicoloration chez *P. isosceles*.

Key-words. - Paralichthyidae, *Paralichthys isosceles*, ASW, Southwest Atlantic, Ambicoloration.

Dawson (1962: 144) defined ambicoloration as "blind side coloration which closely resembles that of the ocular surface even in the reproduction of characteristic spots and markings". Ambicolorate examples have been recorded in a number of flatfishes, such as dabs (Norman, 1934; Love and Vucci, 1973), flounders (Deubler and Fahy, 1958; Dawson, 1969; Hoff, 1969), halibuts (Gudger and Firth, 1935; Mc Keever, 1958), plaices (Norman, 1934), soles (Forrester and Smith, 1971; Haaker, 1973; Romero *et al.*, 1991), tonguefishes (Moe, 1968; Dahlberg, 1970; Haaker, 1973), and turbot (Haaker, 1973; Haaker and Lane, 1973). This phenomenon is not particularly rare in flatfishes, but most of the records are from the coasts of the northwest and the northeast Atlantic, the northwest and the northeast Pacific, and Gulf of Mexico (Dawson, 1964, 1966, 1971; Dawson and Heal, 1976).

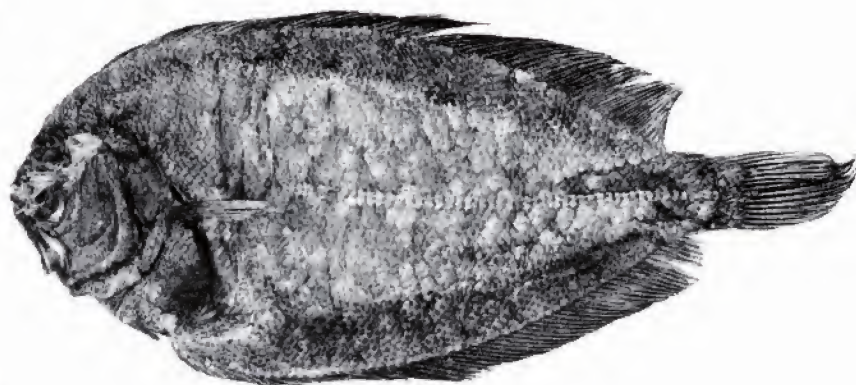
Paralichthys isosceles Jordan, 1891 is one of three left-eyed paralichthyid flounders occurring in Argentinean waters (Díaz de Astarloa, 1994). This medium-sized (to ca. 380 mm SL) and commercially important species is widely distributed in the southwest Atlantic from northern Brazil southward to central Patagonia (Argentina) inhabiting waters from approximately 50 m to 100 m depth (Díaz de Astarloa, 1994).

The objective of the present paper is to describe an almost totally ambicolorate specimen of *P. isosceles* with some morphological peculiarities compared to a normal specimen of the same species. The flatfish, a male of 209 mm SL, was captured on November 1996 by a commercial trawler off Península Valdés (42°48'S and 62°20'W) at a depth of 67 m. This is the first record of an ambicolorate specimen in *P. isosceles*, and the second reported for a *Paralichthys* flounder in the southwest Atlantic (Díaz de Astarloa, 1995).

Material and methods

The fifty four specimens of *Paralichthys isosceles* examined are housed in the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP), Mar del Plata (Argentina), in the Museo Argentino de Ciencias Naturales (MACN), Buenos Aires (Argentina), and in the National Museum of Natural History (USNM), Washington, D.C. (USA). Measurements follow Díaz de Astarloa (1994), and they are presented as per

A



B

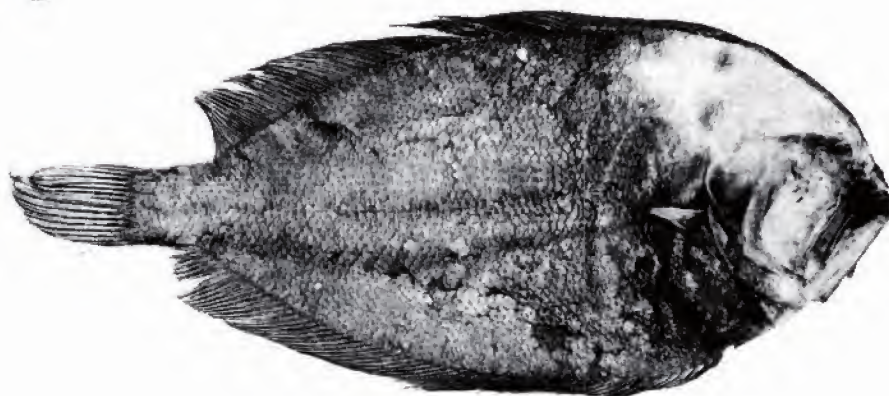


Fig. 1. - A: Ocular side of an almost wholly ambicolorate specimen of *Paralichthys isosceles* (INIDEP 550, male, 209 mm SL, off Península Valdés 42°48'S, 62°20'W, 67 m). B: Blind side of ambicolorate *P. isosceles* (INIDEP 550).

centages of SL. The ratio between the two pectoral fins and the two pelvic fins is also given.

Specimens examined

Paralichthys isosceles. - INIDEP 145, 18 spms, 170-290 mm SL, Patagonia 42°03'S, 60°48'W, 71 m, 7 Jan. 1971; INIDEP 534, 16 spms, 102-377 mm SL, Patagonia 43°38'S, 63°07'W, 77 m, 15 Feb. 1993; INIDEP 550, 209 mm SL, off Península Valdés 42°48'S, 62°20'W, 67 m, 12 Dec. 1996; MACN 2520, 5 spms, 106-147 mm SL, 45°08'S, 66°28'W; MACN 6312, 7 spms, 103-198 mm SL, 37°37'S, 56°14'W, 26 Aug. 1971; MACN 6468, 4 spms, 123-185 mm SL, Rawson, Argentina; USNM 43335, Paralectotype, 211 mm SL Bahía, Brazil,

1887; USNM 43368, 203 mm SL, Bahía, Brazil, 1887; USNM 43371, Lectotype, 203 mm SL, Bahía, Brazil, 1887.

Results and discussion

The blind side of the body of the ambicolorate specimen is darkly pigmented except for the anterior portion of the body which has dark pigments only on the opercle, subopercle, a small region adjacent and dorsal to the head, and the distal half of the pectoral fin. Two lighter pigmented areas were present on the unpigmented dorsal region of the head (Fig. 1). The blind side had one of the three typical ocelli (the upper one) of the species in a same position than that of the ocular side. The upper eye is situated posteriorly

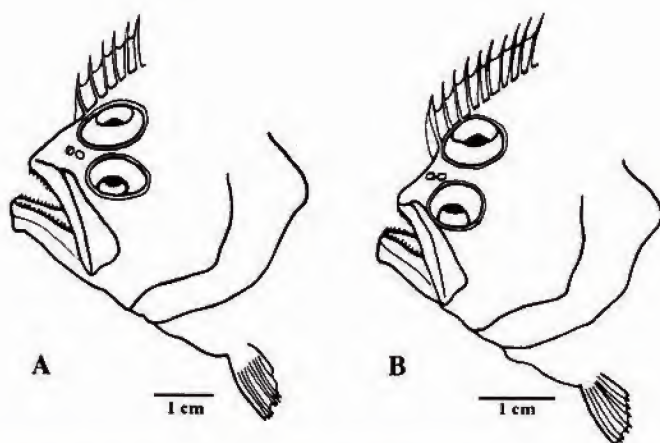


Fig. 2. - A: Anterior part of the ocular side of the head of a normal specimen of *Paralichthys isosceles* (INIDEP 534, 253 mm SL, 43°38'S, 63°07'W, 77 m). B: Anterior part of the ocular side of the head of the ambicolorate *P. isosceles* (INIDEP 550).

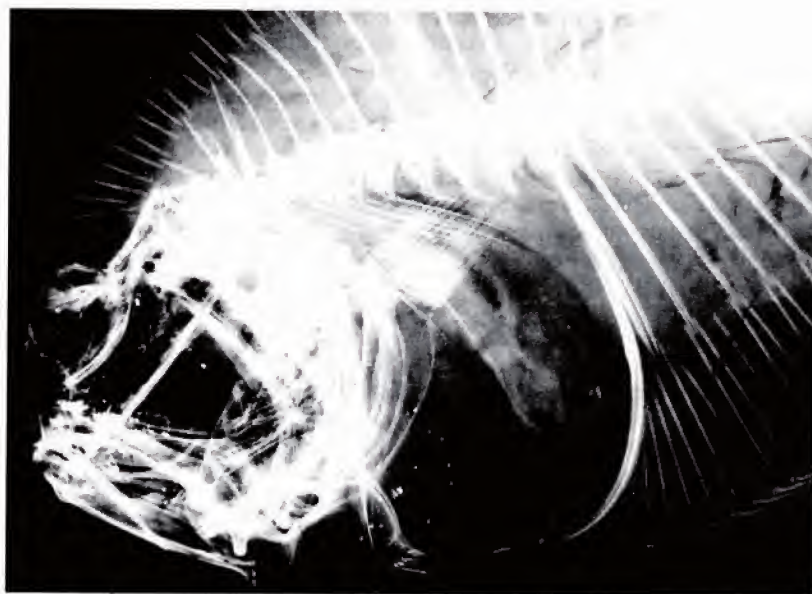


Fig. 3. - Radiograph of an ambicolorate specimen of *Paralichthys isosceles* (INIDEP 550, male, 209 mm SL, off Península Valdés 42°48' S, 62°20' W, 67 m) showing a depression on the epicranial region.

in relation to the lower eye and close to the dorsal margin of the head. There is a depression in the frontal region, anterior to the upper eye. (Figs 2B, 3). The blind-side-pectoral fin is 17.8% shorter than that of the ocular side. The pelvic fin of the

blind side is 27.9% longer than that of the ocular side (Table I).

Norman (1934) reported that ambicolorate specimens have the upper eye in a position that suggests an incomplete migration. In addition,

Gudger (1936) described an abnormal, reversed and nearly totally ambicolorate summer flounder, *Paralichthys dentatus*, with a hooked dorsal fin and an incompletely migrated eye. Dawson (1969) also reported an almost totally ambicolorate southern flounder, *Paralichthys lethostigma*, with a hooked dorsal fin and partially migrated eye.

Examination of 53 "normal" specimens of *P. isosceles* revealed that the upper eye is slightly anterior to the lower eye, and that the interorbital space is 1 - 1.6% of SL (Fig. 2A) (Díaz de Astarloa, 1994). The ambicolorate specimen has its upper eye situated slightly behind the lower eye, also the interorbital space is 3.3% of standard length (Fig. 2B). The upper eye of wholly ambicolored flatfishes is usually situated on the dorsal margin of the head, with the eye being plainly visible from a blind side view (Gudger, 1936). In this case, the eye migrated over the dorsal ridge, but did not reach a normal position (Fig. 2B). Haaker and Lane (1973) also reported that in almost totally ambicolored individuals of California halibut, *Paralichthys californicus*, the migrating eye was abnormally positioned. Our specimen does not have a distinct hook above the migrated eye (as reported in Norman, 1934), but a depression in the epicranial region is noticeable (Fig. 3). Haaker and Lane (1973) reported a case of depression in the frontal region of a specimen of diamond turbot, *Hypopsetta guttulata*, and suggested that the anomaly was due to ossification of the cranial bones around the migrating eye.

In normal specimens of *P. isosceles*, the pectoral fin of the blind side is 30% shorter than the ocular-side fin (Díaz de Astarloa, 1994). The blind-side fin of the ambicolorate specimen is 17.8% shorter than that of the ocular side. Similarly, in typical *P. isosceles* the pelvic fins are normally subequal in size; the ocular-side fin being slightly longer than the blind-side fin. In the ambicolorate flounder, the pelvic fin of the blind side is 27.8% longer than that of the ocular side (Table I).

Paralichthys isosceles has three conspicuous dark ocelli on the posterior half of the body. Two ocelli are situated near the edges of the body on a vertical line almost midway between the pectoral girdle and the base of the caudal fin. The third ocellus is located on the lateral line anterior to caudal peduncle. The ambicolorate side of the abnormal *P. isosceles* showed an ocellus situated in the same position as the upper body edge ocellus of the ocular side. Gudger (1936) reported a case of ambicoloration in summer flounder with 15 large spots on the blind side of the fish, with about 12 in identical positions as those of the eyed side.

Although ambicoloration in paralichthyid flatfishes was previously recorded in the area (Díaz de Astarloa, 1995), this is the first record of an almost wholly ambicolorate specimen in *Paralichthys isosceles*.

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Table I. - Comparative measurements made upon typical *Paralichthys isosceles* and an almost wholly ambicolorate specimen of the same species. Standard length (SL) is expressed in mm. All other measurements are presented as percentages of SL. The ratio between the two pectoral fins and the two pelvic fins is expressed in hundredths of ocular-side fin lengths.

	Typical <i>Paralichthys isosceles</i> (N = 53)			Ambicolorate <i>P. isosceles</i>
	Range	Mean	SD	
Standard length	102 - 377	-	-	209
Pectoral fin length (ocular side)	15 - 16.5	15.9	0.8	16.3
Pectoral fin length (blind side)	10.8 - 11.4	11.1	0.6	13.4
Ratio between both pectoral fins	118 - 131	130	1.4	117.8
Pelvic fin length (ocular side)	7.9 - 9.2	8.7	0.2	6.2
Pelvic fin length (blind side)	6.8 - 8.8	7.9	0.4	8.6
Ratio between both pelvic fins	104 - 114	109	1.1	72.2
Interorbital width	1 - 1.6	1.4	0.2	3.3

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REFERENCES

- DAHLBERG M.D., 1970. - Frequencies of abnormalities in Georgia estuarine fishes. *Trans. Am. Fish. Soc.*, 99(1): 95-97.
- DAWSON C.E., 1962. - Notes on anomalous American Heterosomata with descriptions of five new records. *Copeia*, 1962(1): 138-146.
- DAWSON C.E., 1964. - A bibliography of anomalies of fishes. *Gulf Res. Rep.*, 1(6): 308-399.
- DAWSON C.E., 1966. - A bibliography of anomalies of fishes. Suppl. 1. *Gulf Res. Rep.*, 2(2): 169-176.
- DAWSON C.E., 1969. - Three unusual cases of abnormal coloration in northern Gulf of Mexico Flatfishes. *Trans. Am. Fish. Soc.*, 98(1): 106-108.
- DAWSON C.E., 1971. - A bibliography of anomalies of fishes. Suppl. 2. *Gulf Res. Rep.*, 3(2): 215-239.
- DAWSON C.E. & E. HEAL, 1976. - A bibliography of anomalies of fishes. Suppl. 3. *Gulf Res. Rep.*, 5(2): 35-41.
- DEUBLER E.E. Jr. & W.E. FAHY, 1958. - A reversed ambicolorate summer flounder, *Paralichthys dentatus*. *Copeia*, 1958(1): 55.
- DÍAZ DE ASTARLOA J.M., 1994. - Las especies del Género *Paralichthys* (Pisces, Paralichthyidae) del Mar Argentino. Morfología y Sistemática. Tesis Doct., 194 p. Fac. Cs. Ex. y Nat., Univ. Nac. de Mar del Plata, Argentina.
- DÍAZ DE ASTARLOA J.M., 1995. - Ambicoloration in two flounders, *Paralichthys patagonicus* and *Xystreus rasile*. *J. Fish Biol.*, 47: 168-170.
- FORRESTER C.R. & M.S. SMITH, 1971. - Ambicoloration in a petral sole (*Eopsetta jordani*). *J. Fish. Res. Bd. Can.*, 28(10): 1672-1674.
- GUDGER E.W., 1936. - A reversed almost wholly ambicolorate summer flounder, *Paralichthys dentatus*. *Am. Mus. Novit.*, 896: 1-5.
- GUDGER E.W. & E.F. FIRTH, 1935. - An almost totally ambicolorate halibut, *Hippoglossus hippoglossus*, with partially rotated eye and hooked dorsal fin - the only known specimen. *Am. Mus. Novit.*, 811: 1-7.
- HAAKER P.L., 1973. - Ambicoloration in some California flatfishes. *Calif. Fish Game*, 59(4): 299-304.
- HAAKER P.L. & E.D. LANE, 1973. - Frequencies of anomalies in a bothid (*Paralichthys californicus*) and a pleuronectid (*Hypopsetta guttulata*) flatfish. *Copeia*, 1973(1): 22-25.
- HOFF F.H. Jr., 1969. - Ambicoloration of an adult flounder, *Paralichthys albigutta*. *Copeia*, 1969(1): 208-209.
- LOVE M.S. & J. VUCCI, 1973. - Partial ambicoloration in three California flatfishes. *Calif. Fish Game*, 59(2): 146-148.
- Mc KEEVER K.L., 1958. - Albinism and ambicoloration in the California halibut. *Calif. Fish Game*, 44(2): 171-174.
- MOE M.A. Jr., 1968. - A reversed, partially ambicolorate tonguesole, *Symphurus diomedianus*, from the Gulf of Mexico. *Copeia*, 1968(1): 172.
- NORMAN J.R., 1934. - A Systematic monograph of the flatfishes (Heterosomata). *Br. Mus. Nat. Hist.*, 1: 1-459.
- ROMERO J.R., CÁRDENAS L.A.A. & F.G. MAGANA, 1991. - First record of partial ambicoloration in spotted turbot (*Pleuronichthys ritteri*). *Calif. Fish Game*, 77(4): 212-213.

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